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AUTHOR Dunn, Patricia
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ABSTRACT

By linking a first-year writing class and an introductory chemistry class at Utica College of Syracuse University (Syracuse, New York) the instructor hoped to foster camaraderie among the students; help students see the connections between the two disciplines; and disrupt students' pattern of unquestioning acceptance of the authority of the published text and of believing everything they see on the printed page. In an 8-week joint project of the linked courses, students studied the ozone controversy by reading about it in 11 articles and essays from a variety of periodicals. Students read the articles, discussed the topic in class, wrote about it in a reading log, and did a summary and critique of one of the articles. Using these articles as a base, they also wrote a thesis-oriented research paper on ozone, which served as a project for both the English class and the Chemistry class. They completed the paper in a series of drafts, the peer responses to which were facilitated through the use of an interactive computer lab. In anonymous evaluations they wrote at the end of the course, students seemed to go beyond their initial confusion and disillusionment to a more sophisticated awareness of rhetorical strategies and investedness on the part of "experts." Students demonstrated the confidence to distance themselves from information sources and to see themselves as participants in the knowledge-making process. (Eighteen references are attached.) (RS)

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English 101 and Chemistry 101: Examining Texts Through Different Lenses

by Patricia Dunn
Utica College of Syracuse University

One objective of linked classes--having the same group of students register for the same sections of English 101 and Chemistry 101--was to foster camaraderie among first-year students. It was hoped that by seeing the same group of people five days a week and sharing the same instructors and assignments, students might develop a support group, so necessary for a successful first year. Since writing projects in this linked class involved cycles of drafting and peer responding, it was important for students to become a community of writers.

A second objective of linking my section of English 101, a first-year writing class, with a section of my colleague Bill Pfeiffer's Chemistry 101 class was to help the same group of students see connections between the two disciplines. It is not enough for faculty to assume students will see how courses are interrelated. Indeed, instructors themselves may be unable to articulate exactly what one discipline has to do with another. In these two linked courses, we hoped to provide opportunities for students and their professors to

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explore the interrelatedness of chemistry and English by examining texts through both a rhetorical and a scientific lens.[1]

The third, and most important, motive was to confuse the students. First-year students enter college with pens poised, ready to take notes on the "answers" and "truth" they anticipate getting. They have great respect for the authority of a published text, which often intimidates them with sophisticated syntax, technical vocabulary, and educational level of its author. I am convinced that the main reason so many undergraduates plagiarize so frequently is that they feel overpowered by the published text. They are unable to view it as the writing of a fallible individual. In a major research project in this link, we tried to disrupt this pattern of reading and believing everything on the printed page.

Challenging a text is a first step toward critical thinking, an approach to reading and writing that does not develop overnight. Students may come to college already wary, for example, of certain kinds of manipulative advertising maneuvers, though they may not be able to name the specific rhetorical strategy employed. Therefore, the discussion of critical thinking that takes place in their first-year linked courses is an enhancement of what they already know--helping them become more consciously aware of the more sophisticated strategies which become apparent when texts are examined on a micro level. As Ann Berthoff puts it, "The best way to

[1]In this linked class, all students in my section of English 101 were supposed to be co-registered in the same section of Bill's Chemistry 101. Because of unanticipated registratation difficulties, there were several students in both classes who were not part of the linkage. However, we had enough students taking both classes that we were able to proceed with our planned project.

teach critical reading is by the exhaustive analysis of short, complex passages: the model is sipping whiskey, not diet soda" (121). This alertness to technique in both reading and writing is not a "skill" easily measured by conventional comprehension tests or writing exams.

In an eight-week, joint project of these linked courses, we studied the ozone controversy by reading about it in eleven articles and essays from a variety of periodicals: *Science*, *Time*, *Fortune*, *Business Week*, *The Economist*, *Public Utilities Fortnightly*, *Drug and Cosmetic Industry*, and *The Progressive Grocer*.[2] Students were further saturated with information on this issue through their chemistry textbook and through lectures and discussions in Bill's class. They read the articles, discussed them in class, wrote about them in a reading log, and did a summary and critique on one of them. Using these articles as a base, they also wrote a thesis-oriented research paper on ozone, which served as a project for both English and chemistry. They completed this in a series of drafts, the peer responses to which were facilitated through the use of an interactive computer lab. By working so long and hard on one extended project, students could closely examine these general-interest, business-oriented, and scientific texts from both a rhetorical and scientific perspective.

As might be predicted, the *Fortune* article, "Air: How Clean is Clean Enough?" discussed the economic cost of proposed anti-pollution regulations and foregrounded "largely inconclusive" evidence regarding ozone depletion and other industrially-caused

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[2] For a complete list of articles used, see Works Cited.

pollution problems. An article in the "Science and Technology" section of *Business Week* quoted an epidemiologist from the National Cancer Institute who said that rising skin cancer rates could not be conclusively linked to ozone depletion. Class discussions of these pieces touched on who might be typical readers of these magazines, who might be advertizing in them, and the authors' decisions to summarize certain studies and quote from certain experts, and not others.

We also examined writing in another business periodical aimed at a particular audience, *Drug and Cosmetic Industry*. In an editorial, Donald A. Davis talks about the "menace" of chlorofluorocarbons and the possibility of a second "hole" in the ozone layer (his quotation marks). This gave us the opportunity to talk about the rhetorical use of quotation marks--the ultimate academic sneer--and the purpose of using them around those particular words in a journal, some of whose readers manufacture hairspray.

In "Stratosfears," a short piece that appeared in *The Economist*, it is hinted that the car exhaust pollution and ozone produced at ground level might actually help replace the ozone levels in the upper atmosphere--a solution viewed as preposterous in a later article in *Time* magazine ("In Search of a Magic Bullet"). Here were differences not only in rhetorical approach and selection of facts, but differences in questions of fact. It was at this point that students' own knowledge from their Chemistry 101 class could be used to help them sort through conflicting arguments. In Bill's class they were learning chemical nomenclature and conditions under which oxygen

became ozone. As beginning chemists, they were learning to judge for themselves the accuracy of statements made in all these journals.

The three *Time* magazine articles we used contextualized the issue somewhat by using phrases such as, "No one is sure just how such concentrations of the chemical got there or whether it is destroying ozone" (Lemonick 63). The *Time* articles were also interesting because they provided many opportunities to talk about such strategies as quoting selected VIPs, using metaphors, and employing shocking facts and statistics.

While my students had an easier time with the science texts than I did because of what they were learning in Bill's class, they were, nevertheless, confused by the group of readings. Many of them expressed frustration over the contradictions they saw in different analyses of the ozone problem. While some saw it as a business view versus a scientific view, others realized that not all scientists agreed on causes or solutions. This rather lengthy comment from one student illustrates his frustration:

> The articles that we have read, both in and out of class, have me somewhat confused. Some articles seem to be very concerned with the ozone layer problem, yet other articles make it sound as if the American public should care less about it.
>
> I have close to fifteen articles based on the ozone problem, yet not a single pair of these articles have results that are even somewhat related to each other. I want to prove to people that maybe people might be using this information in order to manipulate the public into things. As sick as this might sound, the ozone problem might just be a small problem blown way out of proportion by the media. On the contrary, the problem might require the World's immediate attention or this could turn into a natural disaster of global proportions.
>
> In a magazine *Science and Technology*, scientists have predicted hundreds of cases of skin cancer to occur in the near future because of the lack of ozone above the U.S. Yet in another article by Jennifer Whalen, she says that the heat about a hole in the ozone layer is all jibberish. She says that the world has

> nothing to worry about because there hasn't been a rise in the level of ultraviolet radiation (UV radiation) that has been detected on the planet's surface. Who are we to believe? (Mike)

If the published text is the "truth," what does it mean when "truths" clash? Having one's view of reality challenged may be the first harrowing step toward critical thinking, which can begin only after one has been knocked off one's pins, so to speak. Seeing contradictory evidence instantly problematizes for students the authority of the text. When expectations are thus altered, students are confused and frustrated. It is the struggle to make sense of this chaos that constitutes real learning. In *Critical Teaching and Everyday Life*, Ira Shor writes:

> In a pervasive mass culture like ours, it makes sense for liberatory learning (de-socialization) to be an unpredictable experience. The transcendent process goes backward and forward, up and down, ahead in an unexpected leap and back in an unanticipated problem. I find it surprising and frustrating, illuminating and rewarding. (268)

While several students expressed a frustration similar to Mike's, another student writes that it was the linked project itself that for her led her to develop a "personal interest" in the ozone controversy:

> Having learned about the significant ozone depletion issue in both courses was extremely beneficial because we got a chance to understand it from two perpectives. Discussing it in two courses also forced us to remember and understand the issue, and its emergency. Because of these linked courses and the amount of time we spent on ozone, I have taken a personal interest in this issue. I feel so much more informed, and I have definitely realized the importance of action on our behalfs. (Claudia's emphasis)

Notice that this student has gone beyond mere interest in the issue to the realization "of the importance of action on our behalfs." Whether or not this student will, indeed, act on her views regarding ozone remains to be seen. But her new insights have awakened in her the importance of action--the end goal of Freire's critical pedagogy (Shor,*Freire for the Classroom* 42-43).

In anonymous evaluations they wrote at the end of the course, I asked students to comment on the ozone project in general and on what they had learned about reading. They seem to have gone beyond their initial confusion and disillusionment to a more sophisticated awareness of rhetorical strategies and investedness on the part of "experts."

> Readers should remember that persuasive writers can be tricky. They can bend the truth to their side of the topic. . . . The reader should be knowledgeable about the topic before reading a persuasive essay. The reader should also make sure any facts or statistics are consistent and accurate. To get a better view of the topic read an article from authors on both sides of an issue. (Student 1)

> I have come to notice that many people do not like to argue or disagree with an expert or someone with a high title such as if someone had a PhD on the subject. (Student 2)

> When a writer uses facts and statistics you have to pay attention to how they weave them in. One writer may use a statistic in a negative way. Another writer could use the same information in a positive way, depending on how they **use the words.** (Student 3's emphasis)

> If you sit down and read an article on one particular issue and the author has a goal in mind to persuade you to think one way or another that is all the author will write about. The author will show that side of the story and may throw in the other side just briefly, but make it seem not quite as important. You have to remember that a writer has a specific goal in mind to make you think a specific way about a specific topic **depending on who that writer may be writing for**. (student 4, my emphasis)

In *Freire for the Classroom,* Ira Shor writes that "Critical literacy invites teachers and students to problematize all subjects of study, that is, to understand existing knowledge as a historical product deeply invested with the values of those who developed such knowledge" (24). One student applies the distrust he has developed toward ozone articles to other published texts:

> When a person reads only one article of controversy, it is important to keep many things in mind. I think some important things to look for is who is the author, what do they do for a living, and at what date it was written. This is important because often you will come across a paper that is written by somebody [who] will agree or disagree because they happen to be in that field. An example is one of the articles we read in the book for class. We read an article that was for [in favor of] texts performed on animals, but the author was a scientist that regularly performed these tests. (Gary)

While helping students become critical **readers** is important, what does this have to do with helping them become better **writers**? These students seem to have reclaimed from the published texts some of the power that at first intimidated them. If first-year writers are to do the academic tasks demanded of them--reading, synthesizing, writing, and critiquing--they need to think of themselves as empowered readers and writers. They need the confidence--even the healthy intellectual cynicism--to distance themselves from information sources and to see themselves as participants in the knowledge-making process. In a 1991 *College English* essay, Dan Mahala criticizes many current writing-across-the-curriculum programs for smoothing over conflicts in different fields and instead over-promoting efforts to get students to "think

as" chemists, sociologists, historians, and so on (780).[3] He calls for the movement to return to its more radical roots in critical thinking and to allow students to see the wires, so to speak--to become a part of the rich diversity of views always present, but sometimes carefully hidden, in every field.

For me, one of the most gratifying analyses came from Mary, who, while recognizing the background experienced chemists have regarding the ozone controversy, is also beginning to develop confidence in herself as an expert:

> I chose to discuss the concept that the whole world is in terrible danger due to this depleting ozone. I also wrote that not only are our lives in danger, but also the lives of future generations. I went from article to article rereading them, in order to get the gist of what each one said. I then took quotes and facts that would best back up my thesis. I read many paragraphs and synthesized what I thought they were trying to say. I then started my first rough draft, writing what I thought ozone was, its reason for depleting, and facts on what dangers it causes. I quoted people in order to get some creditable sources. Scientists who have worked on the ozone for many years have much more years of experience on this issue than myself. **I must admit after reading quite a few articles, I feel that I have some knowledge on this issue.** (my emphasis)

This view of herself as knowledgeable is crucial to developing the voice needed to write well. Mary's emerging confidence comes not only from her wide reading, but also from her growing knowledge of both rhetoric and chemistry. To become critical readers <u>and writers,</u> students not only need to question the authority of published texts, but also to believe in the authority of their own texts. Since it may take years for undergraduates to develop an authority and voice based on their own experience, an alternate route is to challenge the texts--or, better yet, to watch as the texts argue with each other.

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[3] For a similar critique, see Parker and Goodkin.

When some scientists say the ozone hole is catastrophic, and others claim it is practically a normal occurrence, students are stunned. They discover the false dichotomy of "right" and "wrong," replacing it with a more sophisticated view of the world, becoming aware of fine lines and interested perspectives. Only then can they join the debate.

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